REMARKS

These remarks are submitted in reply to the Office Action dated June 20, 2005. Applicant respectfully requests reconsideration and further examination of the patent application under 37 C.F.R. § 1.111.

Upon entry of the foregoing Amendment, claims 1 – 5, 11, 14 – 19, 25, 28 – 35, 41 and 45 are pending in the application. Originally incorrectly numbered claims 40 – 46 have been renumbered 39 – 45 (although newly numbered claims 39, 40, 42, 43 and 44 have been cancelled). Based on the remarks herein, Applicant respectfully requests that the Examiner reconsider and withdraw all outstanding rejections.

Remarks regarding §103 rejections

Applicant has amended independent claims 1 and 15 to include:

wherein said tunable band pass filter associated with said second RF switch utilizes voltage tunable dielectric capacitors to enable tuning

Further, Applicant has amended claim 31 to include:

wherein said first tunable band pass filter utilizes voltage tunable dielectric capacitors to enable tuning;

> These limitations were previously found in dependent claim 6, dependent claim 20, and dependent claim 36 and incorporated into the aforementioned independent claims. The Examiner rejected these dependent claims stating, "Per claims 6, 20 and 36, Hagan further teaches that variety of filters could be utilized for inventive front-end circuit, for Example SAW filters (see paragraph 57), thus it is inherent that said

tunable band pass filter associated with said second RF switch utilizes voltage tunable dielectric capacitors to enable tuning.

Applicant has limited the scope of the claims to include the use of voltage tunable dielectric capacitors and thus has deleted dependent claims covering MEMS capacitors and diode varactors.

Applicant submits that Hagan does disclose the following set forth by the office action:

...it is possible to construct some of the filters as ceramic filters (for example, MWK filters, SAW filters, as FBAR filters, as stripline or as chip LC filters) and to embed these on a substrate ceramic, for example, an LTCC multi-layer ceramic (Low Temperature Co-fired Ceramic).

However, Applicant also submits that none of the enumerated filters by Hagan inherently use voltage tunable dielectric capacitors. Indeed, no mention of the voltage tunable dielectric capacitors described and claimed in the present invention are mentioned at all in Hagan (actually, there is no mentioned of tunable capacitors, varactors, dielectric material, voltage tunable dielectric material or any other terms commonly associated with voltage tunable dielectric capacitors). To illustrate the non-inherency of voltage tunable dielectric varactors in the filters of Hagan, a SAW filter is analyzed.

A surface acoustic wave (SAW) is a type of mechanical wave motion which travels along the surface of a solid material. As opposed to voltage tunable dielectric capacitors which is a new technology recently developed by the assignee of the present invention, the wave was discovered in 1885 by Lord Rayleigh, and is often named after him. Rayleigh showed that SAWs could explain one component of the seismic signal due to an earthquake, a phenomenon not previously understood. These days, these acoustic waves are often used in electronic devices as acoustic waves that have some particular properties that make them very attractive for specialized purposes.

Unlike the substrate of the voltage tunable dielectric varactor of the present invention, a basic SAW device consists of two interdigital transducers (IDTs) on a piezoelectric substrate such as quartz. The IDTs consist of interleaved metal electrodes which are used to launch and receive the

waves, so that an electrical signal is converted to an acoustic wave and then back to an electrical signal. A basic advantage is that acoustic waves travel very slowly (typically 3000 m/s), so that large delays are obtainable. Unlike the voltage tunable dielectric capacitors of the present invention, SAW waves travel along the plane surface of a solid material. As the wave passes, each atom of the material traces out an elliptical path, repeating the path for each cycle of the wave motion. The atoms move by smaller amounts as one looks farther into the depth, away from the surface. Thus, the wave is guided along the surface. In the simplest case (an isotropic material), the atoms move in the so-called sagittal plane, i.e. the plane which includes the surface normal and the propagation direction.

For electronic devices, SAWs are generated from an electrical input signal, and then used to generate an electrical output signal. The conversion process (electric to acoustic, or acoustic to electric) is called 'transduction.' It is noted that no transduction occurs whatsoever in the filters that use the voltage tunable dielectric capacitors of the present invention.

To set forth in greater detail why this is case, the SAW filters require piezoelectricity which occurs in many materials but there is a primary requirement that the material must be anisotropic, so that its properties depend on the orientation relative to the internal arrangement of the atoms. Usually, this means that crystalline materials must be used. Again, no such requirement for the present filters which use voltage tunable dielectric capacitors. Unlike the present invention, the most common materials for SAWs are crystals of quartz, lithium niobate or lithium tantalate, which are all piezoelectric. In these crystals the SAW motion is similar to that of the isotropic case described earlier, though with the difference that the wave now has an electric field associated with it. Another important factor is because the material is anisotropic, the SAW properties depend on the orientation at which the substrate has been cut from the original material, so unlike the present invention, this must be specified.

Thus, although not exhaustive, the aforementioned exemplifies the lack of voltage tunable dielectric capacitors being inherent in a SAW (or any of the other listed) filters of Hagan.

In addition to the fact that Hagan does not suggest, teach or even allude to the use of voltage tunable dielectric capacitors and the fact that they are not inherent in the enumerated filters, Applicant submits that it would not be obvious to include in the filters set forth in Hagan with the voltage tunable dielectric capacitor of the present invention. Applicant further attests that the benefits of using the voltage tunable dielectric capacitors during the research and development for the present

invention were surprisingly good and the performance was better than anticipated and would not have been predicted.

Further, numerous implementation problems were overcome in using voltage tunable dielectric capacitors of the present invention and there was some prejudice to not use voltage tunable dielectric capacitors at the time, as it was unsure of the radiation propagation effects that using such material might have. Further, there were technical difficulties to be overcome, such as the aforementioned anticipated negative propagation effects and also the power levels required for tuning had to be considered. Applicant also submits that Applicant and assignee for the present invention have intimate knowledge of the great amount of trial and error and millions of dollars of research and development that was required in order to make the present invention.

Based on the foregoing, Applicant submits independent claims 1, 20 and 36 are in condition for allowance and as the limitations in those independent claims are included in the remaining dependent claims, Applicant submits those claims are in condition for allowance as well.

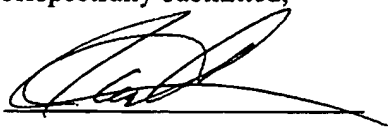
Conclusion

From the foregoing, Applicants respectfully submit that all of the stated grounds of rejections have been properly traversed, accommodated, or rendered moot. Accordingly, Applicants respectfully request that the application is in condition for allowance and respectfully request such action.

If the Examiner believes, for any reasons, that personal communication will expedite prosecution of this application the Examiner is invited to telephone the undersigned at the following number: 202-607-4607.

The USPTO is authorized to charge Deposit Account No. 502697 any fees associated with this response.

Respectfully submitted,



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